DENRYO

Solar Charge Controller

SolarAmp mini

User's Manual

Ver. 3.00

DENRYO CO., LTD.
株式会社　電　菱

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Thank you for purchasing the ***SolarAmp mini*** solar charge controller. This manual contains important safety, installation and operating instructions for the ***SolarAmp mini*** solar charge controller in order to prevent the users from any damage. Make sure to read all of the instructions and cautions in the manual before beginning installation.

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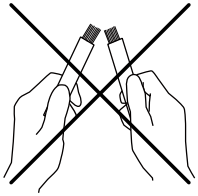
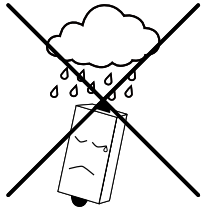
1. Safety Information

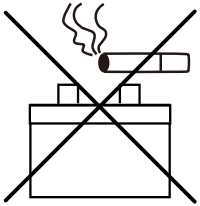
1-1 : Do NOT short circuit



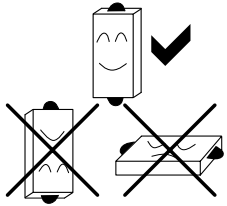
1-2 : Protect from direct rain



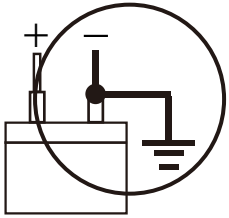
1-3 : Explosion hazard



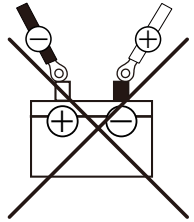
1-4 : Mounting direction



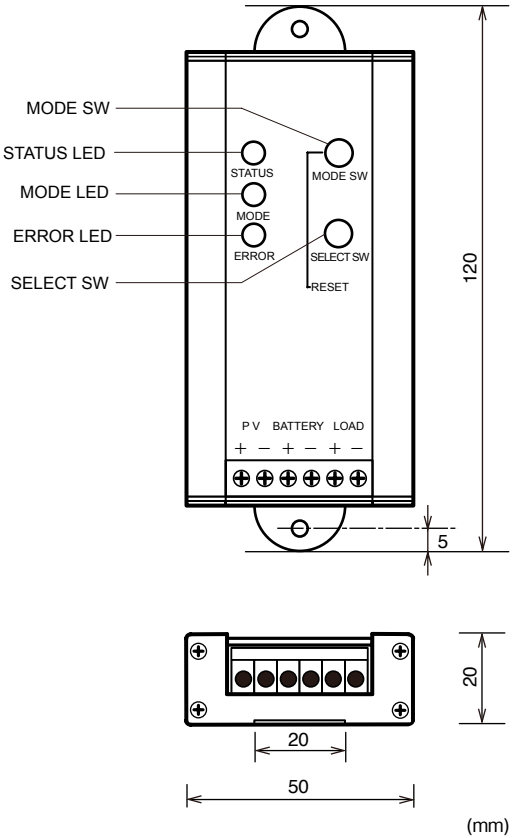
1-5 : Negative earth ground



1-6 : Do NOT reverse polarity connection



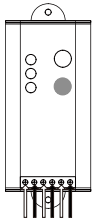
2. Appearance



3. Connection

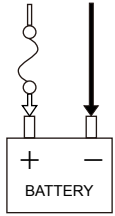
3-1 : Connect wires to ***SolarAmp mini*** first

Screw tightly not to loose.



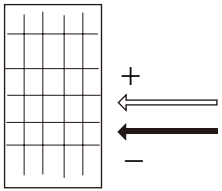
3-2 : Connect to battery

It is recommended to install an external fuses (less than 10A) between controller and battery.



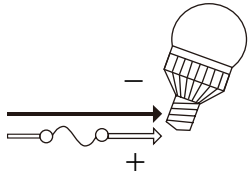
3-3 : Connect to PV

Cover the PV with cloth not to generate electricity.



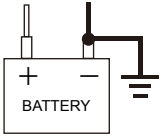
3-4 : Connect to load

It is recommended to install an external fuses (less than 10A) between controller and load.



3-5 : Connect battery to earth ground if necessary

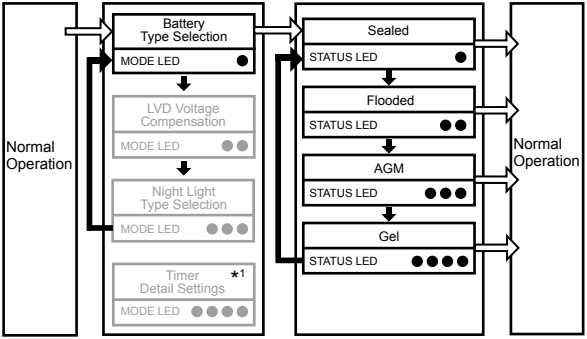
(Negative ground)



4. Operation

4-1 : Battery Type Selection

Follow the white arrow when you push the MODE SW (White Button).
Follow the black arrow when you push the SELECT SW (Red Button).



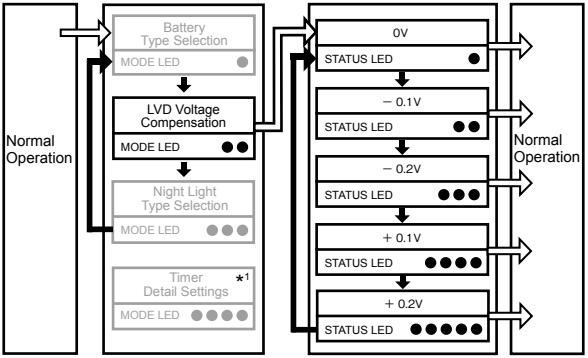
(1) To start setting, push the MODE SW during normal operation, and MODE LED will blink.
(2) Push the SELECT SW, and the number of MODE LED blinks will change.
(3) Check the MODE LED 1 blink, then push the MODE SW.
(4) Check the number of MODE LED and STATUS LED blinks.
(5) Push the SELECT SW, and the number of STATUS LED blinks will change.
(6) The STATUS LED blinks indicate the battery type as below. Push the SELECT SW to desired type.
- STATUS LED 1 blink : Sealed
- STATUS LED 2 blinks : Flooded
- STATUS LED 3 blinks : AGM
- STATUS LED 4 blinks : Gel

(7) Check the number of STATUS LED blinks, then push the MODE SW to finish the setting.
(8) All of the LEDs blink twice, and return to normal operation.

*1 Timer Detail Settings can not be selected at this stage. To access, please see 4-3 Night Light Type Selection before.

4-2 : LVD Voltage Compensation

Follow the white arrow when you push the MODE SW (White Button).
Follow the black arrow when you push the SELECT SW (Red Button).



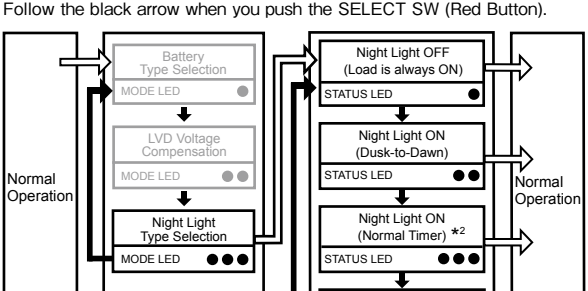
(1) To start setting, push the MODE SW during normal operation, and MODE LED will blink.
(2) Push the SELECT SW, and the number of MODE LED blinks will change.
(3) Check the MODE LED 2 blinks, then push the MODE SW.
(4) Check the number of MODE LED and STATUS LED blinks.
(5) Push the SELECT SW, and the number of STATUS LED blinks will change.
(6) The STATUS LED blinks indicate the compensating voltage value as below. Push the SELECT SW to desired compensating voltage value.
- STATUS LED 1 blink : 0V (No Compensation)
- STATUS LED 2 blinks : -0.1V
- STATUS LED 3 blinks : -0.2V
- STATUS LED 4 blinks : +0.1V
- STATUS LED 5 blinks : +0.2V

(7) Check the number of STATUS LED blinks, then push the MODE SW to finish the setting.
(8) All of the LEDs blink twice, and return to normal operation.

*1 Timer Detail Settings can not be selected at this stage. To access, please see 4-3 Night Light Type Selection before.

4-3 : Night Light Type Selection

Follow the white arrow when you push the MODE SW (White Button).
Follow the black arrow when you push the SELECT SW (Red Button).

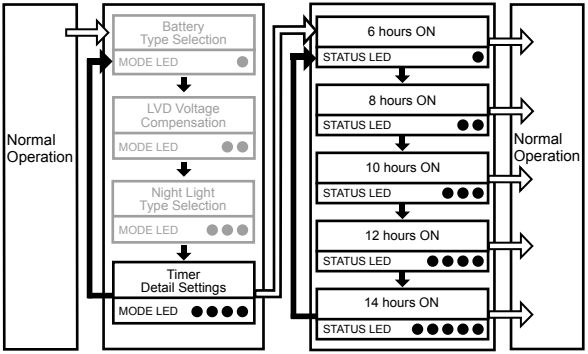


(1) To start setting, push the MODE SW during normal operation, and MODE LED will blink.
(2) Push the SELECT SW, and the number of MODE LED blinks will change.
(3) Check the MODE LED 3 blinks, then push the MODE SW.
(4) Check the number of MODE LED and STATUS LED blinks.
(5) Push the SELECT SW, and the number of STATUS LED blinks will change.
(6) The STATUS LED blinks indicate the night light type as below. Push the SELECT SW to desired type.
    - STATUS LED 1 blink : Night Light OFF (Load is always ON)
    - STATUS LED 2 blinks : Night Light ON (Dusk-to-Dawn)
    - STATUS LED 3 blinks : Night Light ON (Normal Timer)
    - STATUS LED 4 blinks : Night Light ON (Rate Timer)
(7) Check the number of STATUS LED blinks, then push the MODE SW to finish the setting.
(8) All of the LEDs blink twice, and return to normal operation.

*1 Timer Detail Settings can be accessed once normal timer or rate timer be selected.
*2 To set up normal timer detail, Please refer to 4-4 Normal Timer Setting.
*3 To set up rate timer detail, Please refer to 4-5 Rate Timer Setting.

4-4 : Normal Timer Setting

Follow the white arrow when you push the MODE SW (White Button).
Follow the black arrow when you push the SELECT SW (Red Button).

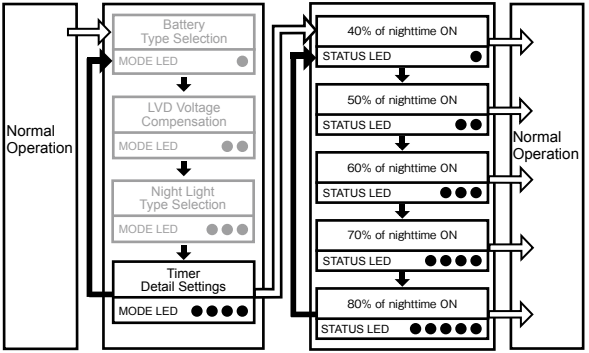


(1) Before setting timer detail, please refer to 4-3 Night Light Type Selection to confirm the normal timer have been turned on.
(2) To start setting, push the MODE SW during normal operation, and MODE LED will blink.
(3) Push the SELECT SW, and the number of MODE LED blinks will change.
(4) Check the MODE LED 4 blinks, then push the MODE SW.
(5) Check the number of MODE LED and STATUS LED blinks.
(6) Push the SELECT SW, and the number of STATUS LED blinks will change.
(7) The STATUS LED blinks indicate the hours as below. Push the SELECT SW to desired time.
- STATUS LED 1 blink : 6 hours in nighttime
- STATUS LED 2 blinks : 8 hours in nighttime
- STATUS LED 3 blinks : 10 hours in nighttime
- STATUS LED 4 blinks : 12 hours in nighttime
- STATUS LED 5 blinks : 14 hours in nighttime

(8) Check the number of STATUS LED blinks, then push the MODE SW to finish the setting.
(9) All of the LEDs blink twice, and return to normal operation.

4-5 : Rate Timer Setting

Follow the white arrow when you push the MODE SW (White Button).
Follow the black arrow when you push the SELECT SW (Red Button).

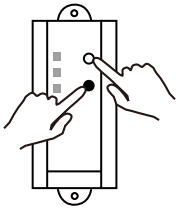


(1) Before setting timer detail, please refer to 4-3 Night Light Type Selection to confirm the rate timer have been turned on.
(2) To start setting, push the MODE SW during normal operation, and MODE LED will blink.
(3) Push the SELECT SW, and the number of MODE LED blinks will change.
(4) Check the MODE LED 4 blinks, then push the MODE SW.
(5) Check the number of MODE LED and STATUS LED blinks.
(6) Push the SELECT SW, and the number of STATUS LED blinks will change.
(7) The STATUS LED blinks indicate the rate of nighttime as below. Push the SELECT SW to desired time.
- STATUS LED 1 blink : 40% of nighttime
- STATUS LED 2 blinks : 50% of nighttime
- STATUS LED 3 blinks : 60% of nighttime
- STATUS LED 4 blinks : 70% of nighttime
- STATUS LED 5 blinks : 80% of nighttime

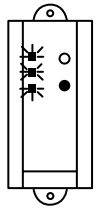
(8) Check the number of STATUS LED blinks, then push the MODE SW to finish the setting.
(9) All of the LEDs blink twice, and return to normal operation.

4-6 : Reset

(1)



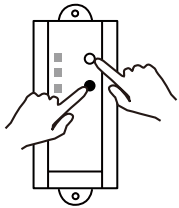
(2)



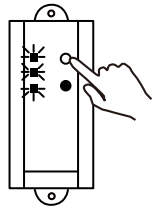
(1) Push MODE SW and SELECT SW simultaneously.
(2) Release your hands from both of the SWs than LED blink twice. Successfully reset will be completed.

4-7 : Factory defaul

(1)

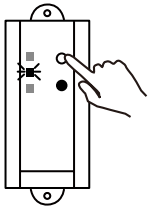


(2)

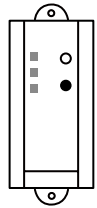


(1) Push MODE SW and SELECT SW simultaneously.
(2) Keep pushing MODE SW and release your hand from SELECT SW only.

(3)



(4)



(3) MODE LED keeps to light during the MODE SW is pushed and hold for five seconds.
(4) When MODE LED turned off, the factory default is compeleted.

5. LED Indications

5-1 : STATUS LED and ERROR LED during normal operation

STATUS LED	
Indication	Description
1 blink	Battery Level Low
2 blinks	Middle
3 blinks	Full

ERROR LED	
Indication	Description
1 blink	LVD (LOAD OFF)
2 blinks	Battery Error
3 blinks	PV Error
4 blinks	LVD & PV Error

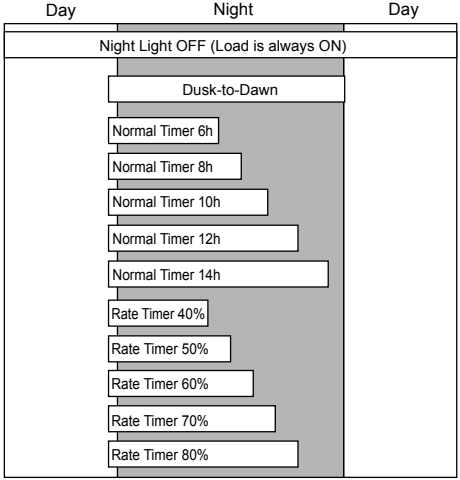
5-2 : MODE LED and STATUS LED during mode setting

MODE LED		STATUS LED	
Indication	Description	Indication	Description
1 blink	Battery Type Selection	1 blink	Sealed*: Charging 14.1V Float 13.7V
		2 blinks	Flooded : Charging 14.4V Float 13.7V
		3 blinks	AGM : Charging 14.3V Float 13.3V
		4 blinks	Gel : Charging 14.3V Float 13.7V
2 blinks	LVD Voltage Compensation	1 blink	0V* (No Compensation)
		2 blinks	-0.1V
		3 blinks	-0.2V
		4 blinks	+0.1V
		5 blinks	+0.2V
3 blinks	Night Light Type Selection	1 blink	Night Light OFF (Load is always ON)*
		2 blinks	Night Light ON (Dusk-to-Dawn)
		3 blinks	Night Light ON (Normal Timer)
		4 blinks	Night Light ON (Rate Timer)
4 blinks	Timer Detail Setting	1 blink	Normal Timer 6h* Rate Timer 40%*
		2 blinks	Normal Timer 8h Rate Timer 50%
		3 blinks	Normal Timer 10h Rate Timer 60%
		4 blinks	Normal Timer 12h Rate Timer 70%
		5 blinks	Normal Timer 14h Rate Timer 80%

*Factory Default Setting

6. Night Light Timer

6-1 : Multi Timer



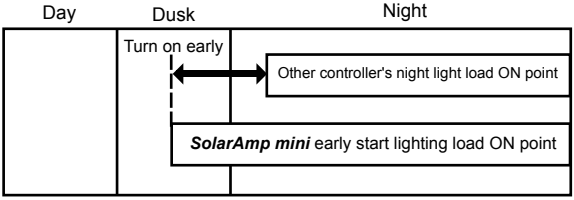
Four Operation Modes

MODE	Description
Night Light OFF	Load is always ON.
Night Light ON (Dusk-to-Dawn)	Load will turn on between dusk time and sunrise.
Night Light ON (Normal Timer)	Customize setting hours 6, 8, 10, 12, 14.
Night Light ON (Rate Timer)	Choose the rate of night time 40%, 50%, 60%, 70%, 80%.

Load Test Method

When the Night light mode is ON and push SELECT SW more than two seconds, the load will turn on. When you release your hand from SW, the load will turn off. (This method is effective only before the load turn on in the day time).

6-2 : Early Start Lighting Function



SolarAmp mini has the early start lighting function. The load will start to turn on from dusk. This function will operate the following day after insatlling ***SolarAmp mini*** at the earliest.

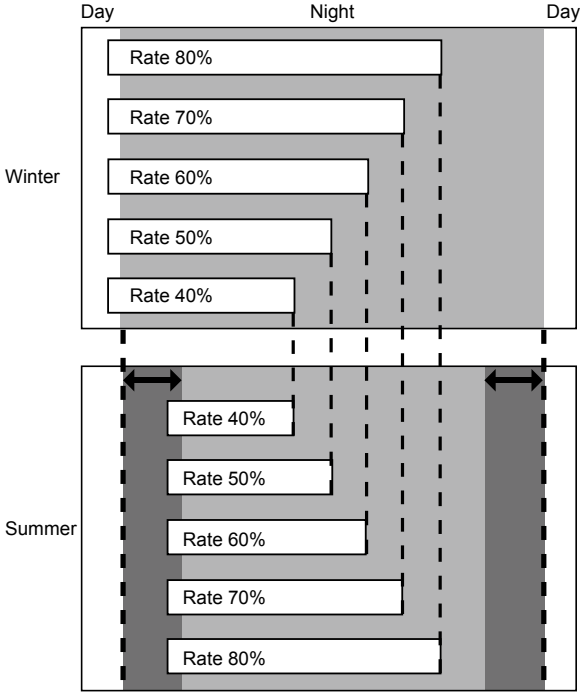
Soon after installing or sudden bad weather, the load will start to turn on by the condition of PV voltage. The conditions are as described.

(1) Solar voltage will be less than 10V.

(2) After that, solar voltage will be less than 8V.

For this reasons, you will need to wait for more than 3 minutes to start to light at the night from charging the battery.

6-3 : Rate Timer Function



SolarAmp mini rate timer is different from a traditional night-light timer. The lighting time of load is set by a rate (%) of night time. Even if the night time is changed seasonally, the lighting-off time will be apporoximately at the same time. There is no need to reset the timer setting as seasons change.

7. Troubleshooting

7-1 : Lighting ERROR LED

LVD : The battery voltage is low. Please charge with the battery 12.5V or more until becoming it.

Battery : The cause is as follows.

- Battery is not connected
- Battery is low or too high voltage
- Short-circuited
- Deeply discharged battery cannot charge with recovery

Please check the wire connection and battery voltage for the system.

PV : The PV voltage is lower than battery voltage. This error will remain for about one minute after PV begins to generate.

There is no problem though this error occurs during the night.

LVD&PV : LVD and the PV error occur at the same time.

7-2 : Battery is not charged

SolarAmp mini charge controller will not charge unless the PV voltage is higher than battery voltage. It takes approximately 3 minutes to start charging from PV voltage. In the event of a battery fault the charge controller will not charge. On the other hand, the charge controller will not charge when battery is fully charged or battery voltage more than 13V.

7-3 : Load does not operating properly

Please check LVD status of solar controller. Even If the battery voltage is over 11.5V, once the controller become LVD, the load will NOT turn on unless the battery voltage be over 12.5V.

7-4 : LED does not light

SolarAmp mini automatically turns off LED. LED lights for one minute only when SELECT SW is pushed.

7-5 : Early start lighting function does not operate

The Early start lighting function does not operate on that day when the installation first day and the setting were changed.

Besides, when it gets dark suddenly by the bad weather, it begins to light detecting from the power generation of the solar battery as well as an usual controller.

8. Specifications

Model	SA-MN05-8
System Voltage	12 V
Max. input Voltage	25 V
Max. input Current	8.5 A
Max. load Current	8.5 A
Min. input battery Voltage	6 V
Grounding	Negative ground
Self-consumption Current	1 mA
Reverse Polarity Protected	Fuse：10 A
Operation Temperature	- 20 ～ + 60 ℃
Storage Temperature	- 30 ～ + 70 ℃
Humidity	5 ～ 95 %RH (non-condensing)
Dimensions (D x W x H)	20 x 50 x 120 mm
Weight	105 g
Wire Size	16AWG (1.3 mm^2) ～ 22AWG (0.33 mm^2)
Battery Type	Sealed, Flooded, AGM, Gel
Charging Voltage	Sealed Battery：14.1 V
	Flooded Battery：14.4 V
	AGM Battery：14.3 V
	Gel Battery：14.0 V
Load Disconnect Voltage	11.5 V (±0.2 V)
LVD Reconnect	12.5 V (±0.2 V)
Charging Algorithm	3-stage (Bulk, Absorption, Float)
Temperature Coefficient	-30 mV/℃

9. Certifications

CE RoHS

10. Limited Warranty

Denryo warrants this prodcut against defects in material and workmanship for a period of ONE (1) year from the date of shipment to the original end user. Before requesting warranty service, check the Operator's Manual to be certain that there is a problem with the product, then contact our authorized distributor.

11. Glossary

PV	:	Photovoltaics Module (Solar Panel)
LVD	:	Low Voltage Disconnect
D/D	:	Dusk to Dawn

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